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Spring 2021

PHYS 121-006: Physics II

Vitaly Shneidman

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Physics 121-006 and 008 Course Syllabus – Spring 2021

Delivery Mode: Converged Learning (NJIT Definition: Delivery of instruction is independent of place, merging the physical and virtual classrooms. There is an attendance expectation and students can choose to attend class face-to-face or using real-time synchronous video conferencing technology..)

Instructor Information

Vitaly Shneidman, PhD

Email: vitaly@njit.edu

Office: 452 Tiernan

Office Hours: TBA

MasteringPhysics course ID: shneidman71682

Lecture: Monday 11am

<https://njit.webex.com/njit/j.php?MTID=mff12219010a69cb5f7b766d2c925bd8a>

Recitations:

121-008, Thursday 2:30pm

<https://njit.webex.com/njit/j.php?MTID=m1cf4984b78841753120fca2514a4d9da>

121-006, Thursday 4pm

<https://njit.webex.com/njit/j.php?MTID=m6de498f52c854ec0107f846fa40df280>

General Information

- Description: Physics 121 is a calculus-based introduction to electricity and magnetism, emphasizing fundamental concepts and applications. It is the second course in a three-course sequence.
- Pre-requisites (all with grade of C or better): Physics 111 or 111H, and Math 111 or 111H.
- Co-requisites: Physics 121A (the lab course) and Math 112 (Calculus-II).

Learning Expectations, Goals, Outcomes

Students will be expected to demonstrate understanding and mastery of calculus-based classical electricity and magnetism up to AC circuits. The topics covered include electric charge, electric and magnetic fields, forces on stationary and moving charges and currents due to electrostatic and magnetic fields, electrostatic potential and potential energy, Gauss' Law, capacitance, current, resistance, DC circuits, the Biot-Savart Law, Ampere's Law, Faraday's Law, inductance, RC circuits, LR circuits, LCR circuits, AC circuits including "phasor diagrams" and resonant oscillations.

In any/all of the above subject areas, students should be able to do the following:

- Recall and use the conceptual and mathematical definitions and be able to explain them.
- Understand the conceptual and mathematical relationships between quantities used.
- Explain and manipulate equations and techniques developed in the text, lectures, problem examples, and in the course of working problems.

- Use symmetry arguments, sketches and diagrams, graphs, algebra, trigonometry, and basic integral and differential calculus methods for reasoning about nature and in setting up and solving textbook-level problems.
- Critically evaluate the soundness and precision of their own reasoning and answers, explain and interpret their solutions to problems in a way that shows understanding, and identify and appraise the range of applicability of their results, and state the limitations of their solutions.
- Apply the skills above to successfully solve textbook-level problems with numeric, symbolic, or conceptual answers.

Learning outcomes are assessed by means of midterm, a final exam, scores on homework assignments, in-class quizzes.

Materials for Physics 121

- Textbook (Abbreviation: Y&F): “University Physics”, 15th Edition, authors Young & Freedman (Pearson, 2020). We use Chapters 21 to 31 in Volume 2. Most students now buy the e-text, which is bundled with the Modified Mastering Physics homework system. The ISBN is 978-0135159552.

Mastering Physics Online Homework System: Each student must obtain an access code kit that allows access to the online homework system specifically for the 15th edition of “University Physics”. In addition to having a valid access code, each student must enroll in the Mastering Physics (MP) “course” for her/his Physics 121H section using a course identifier code **shneidman71682** (sections 006 and 008 only!). Homework assignments will be posted on-line in Mastering Physics and will be automatically graded. Specific information will be available directly from all the instructors, and/or their web sites. The access code kit must be for the 15th edition specifically.

- NJIT Canvas System will be used for weekly quizzes, midterm and final.

Grading

Final Letter Grades:

- **25%** Midterm
- **32%** for the final exam
- **20%** for the total of homework
- **23%** Quizzes
- The conversion of term average values to letter grades will use the following cutoff values: **85% for A, 75% for B+, 65% for B, 56% for C+, 50% for C, 45% D and F below 40%.**

Examinations

- Midterm: Monday, April 5, 2021, 4:15 – 5:45 PM
- Weekly in class only Quizzes
- Comprehensive Final Exam 2.5 hours long

The final exam will emphasize the work covered after midterm, but also re-caps the whole course.

The exams will be administrated virtually: no face-to-face exam session. You can choose your preferred place to take the exams.

Physics Department Policy on students missing a common exam or exam

(<https://physics.njit.edu/common-and-final-exams> at the end of the page)

If a student has to miss a common exam or exam due to illness or personal reasons, the student must go to the Office of the Dean of Students to get an official excuse and notify the course instructor. If the excuse is granted by the Office of the Dean of Students, a notice will be sent to the Physics instructor and the student will be excused from the common exam or exam. The Physics Department will follow the course policy to generate a 'make up' grade based on the common exam material which is on the final exam.

Course Policies

Honor Code Violations or Disruptive Behavior: NJIT has a zero-tolerance policy for cheating of any kind and for disruptive student behavior. Violations will be reported to and judged by the Dean of Students. The penalties range from failure in the course plus disciplinary probation up to expulsion from NJIT. Avoid situations where your own behavior could be misinterpreted as dishonorable.

- Students are required to agree to the NJIT Honor Code on each exam.
- Turn off all phones, wireless devices, laptops, and messaging devices of all kinds during classes and exams.
- Please do not eat, drink, or create noise in class that interferes with the work of other students or instructors.
- Needless to say, do not contact any “tutoring services” for help during an exam.

Attendance will be taken at all classes and exams.

Withdrawal: If you must withdraw from the course, do it officially through the Registrar before the last withdrawal date. If you simply stop attending and taking exams your instructor will have to assign a failing grade in the course.

Course Work

The Class Schedule (see below) lists the topics covered, text readings, and homework assignments, exam dates, etc. week by week throughout the term. Some details may be subject to change depending on the class schedule. Be sure to do the homework problems: it is almost impossible to succeed in physics courses without working a lot of problems. It will not help to use someone else's solutions. It can help to form study groups so long as each group member participates in real discussion and independent thought.

Each weekly work unit starts with a lecture and includes a related homework assignment. Some of the homework problems will usually be covered in recitation class and the final HW submit deadline is typically about a week after material is introduced in lecture class.

- Read the assigned sections of the text before the lecture covering that material.
- Read the instructor's lecture notes before class (if provided) and bring them to class.
- Work on homework problems before they are covered in recitation and certainly before they are due.
- The Mastering Physics online system shows the applicable homework due dates and keeps track of scores.

Class Participation: Students are expected to initiate and participate in class discussions by asking and answering questions, doing quizzes, working actively with others during in-class group assignments. When students participate in an active learning environment they become more engaged, learn more, enjoy the course more, and have better success in the course.

Specific Information for the Mastering Physics (MP) homework system:

- You need a valid Mastering Physics account and access code to sign up for the course your instructor sets up on MP. Your instructor will announce the course identifier for you to use when enrolling in your specific class. Use your NJIT email address as the logon ID for your account. Input your name exactly as it appears on NJIT's records: last name first, followed by a comma and your first and possibly middle name. Likewise, enter your 9 digit NJIT ID where indicated. MasteringPhysics course ID: shneidman71682
- For your own reference, record the unique course identifier announced by your instructor, and your login ID and password. Instructors cannot access forgotten logins or passwords.

Help: If you are having trouble in this course visit or email your instructor; do not simply hope for a miracle and fall further behind. All instructors hold office hours (see above) and will also meet with students at other mutually convenient times.

Tutoring: Updates and webex links to tutoring are posted on:

<https://physics.njit.edu/physics-tutoring-sign-sheet>

Academic Support and Students Affairs, Academic Advising Centers: These organizations assist students who need to make academic decisions, sometimes needing support to progress toward successful graduation.

Special Instructions

Refer to COVID-19 Code of Student Conduct Rules and Regulation.

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Week of	Lecture Topics and Classes	Text (Y&F) Readings	Notes
Jan 18	Lecture 01: Vectors, Intro to Fields Lecture 02: Electric Charge & Force	Instructor Notes Sec. 21.1 – 3	
Jan 25	Lecture 03: Electric Field	Sec. 21.4 – 7	
Feb 1	Lecture 04: Gauss' Law	Sec. 22.1 – 5	
Feb 8	Lecture 05: Electric Potential	Sec. 23.1 – 5	
Feb 15	Lecture 06: Capacitance	Sec. 24.1 – 6	
Feb 22	Lecture 07: Current, Resistance, DC Circuits, Intro to Kirchhoff's Rules	Sec. 25.1 – 5, Sec. 26.1 – 2	
March 1	Lecture 08: Multi-loop and RC Circuits	Sec. 26.2 – 5	
March 8	Lecture 09: Charges & Currents in Magnetic Fields	Sec. 27.1 – 8	
March 22	Lecture 10: Sources of Magnetic Field. The Biot-Savart Law, Amperes Law	Sec. 28.1 - 7	
March 29	Review Midterm; Friday April 2: No classes		
	<u>Midterm: April 5 2021</u>	<u>Chapters 21-26</u>	<u>Lecture 1-8</u>
April 5	Lecture 11: Faraday's Law of Induction	Sec. 29.1 – 5	
April 12	Lecture 12: Inductance, RL Circuits	Sec. 30.1 – 4	
April 19	Lecture 13: LC & LCR Circuits, EM Oscillations, AC Circuits	Sec. 30.5 - 6 Sec. 31.1 – 2	
April 26	Lecture 14: AC Circuits, Resonance	Sec. 31.3 - 6	
May 3	Review for final exam		
	May 4: Friday classes meet	Last day of classes	
	Reading Days: May 5-6 <u>Final Exam: May 7-13</u>	No classes <u>Chapters 21 - 31</u>	<u>Comprehensive final exam:</u>

